

***What Is Claimed Is:***

1. A system for handshaking modems over a communications network, comprising:

5 a central modem configured to generate a modified capability indicator from a standard capability indicator, said modified capability indicator being used to indicate that said central modem is able to select a direction of transmission over one or more frequency bands available for use by said central modem; and

10 one or more remote modems able to recognize said modified capability indicator and in response, transmit a response signal over a carrier frequency selected from one of said one or more frequency bands available for use by said central modem.

2. The system of claim 1, wherein said direction of transmission is in the upstream direction and said carrier frequency is selected from the frequency band 25 kHz to 138 kHz.

15 3. The system of claim 2, wherein said capability indicator is amplitude modulated by said central modem to produce said modified capability indicator.

4. The system of claim 3, wherein said modified capability indicator is modulated for 16 milliseconds at 1.2 times nominal power followed by 16 milliseconds of 0.75 times nominal power.

20 5. A method for allocating carrier frequencies while handshaking modems over a communications network, the method comprising the steps of:

(i) transmitting a first signal over an initial upstream carrier frequency in one or more frequency bands available for use by a remote modem;

25 (ii) receiving a modified capability indicator generated

from a standard capability indicator, said modified capability indicator being used to indicate that a central modem is able to select a direction of transmission over one or more frequency bands available for use by said central modem; and

(iii) in response to receiving said modified capability indicator, transmitting a second signal over an allocated upstream carrier frequency selected from one of said one or more frequency bands available for use by said remote modem, said allocated upstream carrier frequency also being within said one or more frequency bands available for use by said central modem.

6. The method of claim 5, wherein said allocated upstream carrier frequency is allocated from the frequency band 25 kHz to 138 kHz by said central xDSL modem.

7. The method of claim 6, wherein a downstream carrier frequency is allocated from the frequency band 276 kHz to 512 kHz.

8. The method of claim 7, wherein said initial upstream carrier frequency is in the frequency band 25 kHz to 138 kHz.

9. The method of claim 8, wherein said initial upstream carrier is spread spectrum modulated by said remote modem.

10. The method of claim 8, wherein said initial upstream carrier is DPSK modulated by said remote modem.

11. The method of claim 7, wherein said initial upstream carrier frequency is in the frequency band 3750 kHz to 5100 kHz.

12. The method of claim 11, wherein said initial upstream carrier is DPSK modulated by said remote modem.

13. The method of claim 7, wherein said allocated upstream carrier frequency is in the frequency band 138 kHz to 276 kHz.

14. The method of claim 13, wherein said initial upstream carrier frequency is in the frequency band 138 kHz to 276 kHz.

5 15. The method of claim 14, wherein said initial upstream carrier is DPSK modulated by said remote modem.

16. The method of claim 6, wherein said standard capability indicator is amplitude modulated by said central modem to produce said modified capability indicator.

10 17. The method of claim 16, wherein said modified capability indicator is modulated for 16 milliseconds at 1.2 times nominal power followed by 16 milliseconds of 0.75 times nominal power.

18. A method for allocating carrier frequencies while handshaking modems over a communications network, the method comprising the steps of:

15 (i) receiving at a central modem, a first signal transmitted over an initial upstream carrier frequency in one or more frequency bands available for use by a remote modem;

(ii) in response to said receiving step (i), generating at said central modem, a modified capability indicator from a standard capability indicator, said modified capability indicator being used to indicate that said central modem is able to select a direction of transmission over one or more frequency bands available for use by said central modem;

20 (iii) transmitting said modified capability indicator to said remote modem; and

25 (iv) receiving at said central modem, a second signal

transmitted over an allocated upstream carrier frequency selected from one of said one or more frequency bands available for use by said remote modem, said allocated upstream carrier frequency also being within said one or more frequency bands available for use by said central modem.

5 19. The method of claim 18, wherein said allocated upstream carrier frequency is allocated from the frequency band 25 kHz to 138 kHz by said central xDSL modem.

20. The method of claim 19, wherein a downstream carrier frequency is allocated from the frequency band 276 kHz to 512 kHz.

10 21. The method of claim 20, wherein said initial upstream carrier frequency is in the frequency band 25 kHz to 138 kHz.

22. The method of claim 21, wherein said initial upstream carrier is spread spectrum modulated by said remote modem.

15 23. The method of claim 21, wherein said initial upstream carrier is DPSK modulated by said remote modem.

24. The method of claim 20, wherein said initial upstream carrier frequency is in the frequency band 3750 kHz to 5100 kHz.

25. The method of claim 24, wherein said initial upstream carrier is DPSK modulated by said remote modem.

20 26. The method of claim 20, wherein said allocated upstream carrier frequency is in the frequency band 138 kHz to 276 kHz.

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27. The method of claim 26, wherein said initial upstream carrier frequency is in the frequency band 138 kHz to 276 kHz.

28. The method of claim 27, wherein said initial upstream carrier is DPSK modulated by said remote modem.

29. The method of claim 19, wherein said standard capability indicator is amplitude modulated by said central modem to produce said modified capability indicator.

30. The method of claim 29, wherein said modified capability indicator is modulated for 16 milliseconds at 1.2 times nominal power followed by 16 milliseconds of 0.75 times nominal power.

31. A method for handshaking modems over a communications network, the method comprising the steps of:

(i) receiving at a remote modem, a modified capability indicator generated from a standard capability indicator, said modified capability indicator being used to indicate that a central modem is able to select a direction of transmission over one or more frequency bands available for use by said central modem; and

(ii) in response to receiving said modified capability indicator, transmitting a second signal over an allocated upstream carrier frequency selected from one of a plurality of frequency bands available for use by said remote modem, said allocated upstream carrier frequency also being in said one or more frequency bands available for use by said central modem.

32. The method of claim 31, wherein said allocated upstream carrier frequency is allocated from the frequency band 25 kHz to 138 kHz by said central xDSL modem.

33. The method of claim 32, wherein a downstream carrier frequency is allocated from the frequency band 276 kHz to 512 kHz.

34. The method of claim 33, wherein said initial upstream carrier frequency is in the frequency band 25 kHz to 138 kHz.

35. The method of claim 34, wherein said initial upstream carrier is spread spectrum modulated by said remote modem.

36. The method of claim 34, wherein said initial upstream carrier is DPSK modulated by said remote modem.

37. The method of claim 33, wherein said initial upstream carrier frequency is in the frequency band 3750 kHz to 5100 kHz.

38. The method of claim 37, wherein said initial upstream carrier is DPSK modulated by said remote modem.

39. The method of claim 33, wherein said allocated upstream carrier frequency is in the frequency band 138 kHz to 276 kHz.

40. The method of claim 39, wherein said initial upstream carrier frequency is in the frequency band 138 kHz to 276 kHz.

41. The method of claim 40, wherein said initial upstream carrier is DPSK modulated by said remote modem.

42. The method of claim 32, wherein said standard capability indicator is amplitude modulated by said central modem to produce said modified capability indicator.

43. The method of claim 42, wherein said modified capability indicator is modulated for 16 milliseconds at 1.2 times nominal power followed by 16 milliseconds of 0.75 times nominal power.

44. A method for handshaking modems over a communications network, the method comprising the steps of:

(i) generating at a central modem, a modified capability indicator from a standard capability indicator, said modified capability indicator being used to indicate that said central modem is able to select a direction of transmission over one or more frequency bands available for use by said central modem;

(ii) transmitting said modified capability indicator from said central modem to a remote modem; and

(iii) receiving a second signal transmitted over an allocated upstream carrier frequency selected from one of said one or more frequency bands available for use by said remote modem, said allocated upstream carrier frequency also being within said one or more frequency bands available for use by said central modem.

45. The method of claim 44, wherein said allocated upstream carrier frequency is allocated from the frequency band 25 kHz to 138 kHz by said central xDSL modem.

46. The method of claim 45, wherein a downstream carrier frequency is allocated from the frequency band 276 kHz to 512 kHz.

47. The method of claim 46, wherein said initial upstream carrier frequency is in the frequency band 25 kHz to 138 kHz.

48. The method of claim 47, wherein said initial upstream carrier is spread spectrum modulated by said remote modem.

5 49. The method of claim 47, wherein said initial upstream carrier is DPSK modulated by said remote modem.

50. The method of claim 46, wherein said initial upstream carrier frequency is in the frequency band 3750 kHz to 5100 kHz.

10 51. The method of claim 50, wherein said initial upstream carrier is DPSK modulated by said remote modem.

52. The method of claim 46, wherein said allocated upstream carrier frequency is in the frequency band 138 kHz to 276 kHz.

53. The method of claim 52, wherein said initial upstream carrier frequency is in the frequency band 138 kHz to 276 kHz.

15 54. The method of claim 53, wherein said initial upstream carrier is DPSK modulated by said remote modem.

55. The method of claim 45, wherein said standard capability indicator is amplitude modulated by said central modem to produce said modified capability indicator.

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56. The method of claim 55, wherein said modified capability indicator is modulated for 16 milliseconds at 1.2 times nominal power followed by 16 milliseconds of 0.75 times nominal power.

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